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METHOD FOR MONOLITHICALLY FORMING DISPLAY PART OF LETTERS, PATTERNS, ETC. ON SURFACE OF MOLDING

[Seikeihin hyomen ni moji • mokuyo to no hyoji bu o ittai ni keiseisuru hoho]

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Claims

1. A method for monolithically forming a display part of letters, patterns, etc., on a surface of a molding characterized by the following facts: when a display part of letters, patterns, etc., is to be formed on the surface of a molding, a recess is formed on the inner surface of the molding; from the bottom surface of the recess, through-holes are formed through the portion where the display part is to be formed; a resin for forming the display part is pressed to the display part forming portion through said recess and said through-holes to form the display part.

2. The method for monolithically forming a display part of letters, patterns, etc. on a surface of a molding described in Claim 1 characterized by the fact that the recess is formed as a continuous portion shared by plural through-holes.

3. A method for monolithically forming a display part of letters, patterns, etc. on a surface of a molding characterized by the following facts: when a display part of letters, patterns, etc. is to be formed on the surface of a molding, an injecting recess and an overflow recess are formed on the inner surface of the molding; from the bottom surface of the recesses, injection through-holes and overflow through-holes are formed through the common display part forming portions, respectively; a resin for forming the display part is pressed to the display part forming portion through said injecting recess and injection through-holes, and, at the same time, the resin flows from said display part forming portion via the overflow through-holes to said overflow recess to form the display part.

4. The method for monolithically forming a display part of letters, patterns, etc. on a surface of a molding described in Claim 3 characterized by the fact that the injecting recess is formed as a continuous portion shared by the plural injection through-holes.

5. The method for monolithically forming a display part of letters, patterns, etc. on a surface of a molding described in Claim 3 characterized by the fact that the overflow recess is formed as a continuous portion shared by the plural overflow through-holes.

Detailed explanation of the invention

The present invention pertains to a method for monolithically forming a display part of letters, patterns, etc. on a surface of a molding made of synthetic resin, rubber or the like.

For example, for a side protecting molding, mudguard, or other moldings made of synthetic resin or rubber for automobiles, the vehicle name, model, mark, etc. are displayed by a resin with a color different from that of the main body of the moldings. In the method for forming said display part, for example, it is necessary to ensure strong attachment of the marking on the molding of the display part of the automobile member. Consequently, a pre-molded molding or mudguard is installed in dies having a cavity having the prescribed letters, pattern, or the like, and a resin of the same type or a similar type with compatibility with the main body of the molding is injection molded in the cavity or is applied by means of transfer molding to be fused monolithically to the molding main body.

As an effective means for embodiment of said method, the present patent applicant has proposed a scheme characterized by the fact that through-holes are formed from the inner surface side of the display part of letters, patterns, etc. on the main body of the molding to reach the display part, and, through said through-holes, a resin is injected to be monolithically molded. According to this method, no trace of the resin injection portion is left on the surface of the display part, and the display part can be formed three-dimensionally with a desired thickness, such that the appearance is outstanding. Also, because resin left in the through-holes is cured and molded monolithically with the leg portions on the inner

surface side of the display part, the obtained display part has high strength against vibration and impact. This is an advantage.

However, it has been found that the aforementioned method has some problems in a practical molding operation. First of all, when the display part is molded, the resin has to be injected into each of the through-holes. Consequently, a strict corresponding relationship must exist between the positions of the through-holes and the positions of the resin injecting ports (gates) of the dies. This leads to complicated a design for the dies. Second, when plural through-holes are present in the display part forming portion, usually, the melt resin is injected through a prescribed runner and gate. However, because the melt resin flowing in the runner or the like has high viscosity, due to the viscous resistance of the melting resin itself and the frictional resistance with the inner wall of the runner or the like, the pressure and temperature of the melt resin fall corresponding to the distance from the resin press-in port. Consequently, depending on the position of the through-hole, over-pressure or insufficient pressure results. In other words, burrs or voids may form as defects of molding on the display part. Third, the melt resin injected into the display part forming portion initially contacts the surface of the dies while flowing in, so the melt temperature falls. Then, a difference in temperature is generated within the resin, and, when plural through-holes are present on a single display part, at the merging point of the resin flowing in through different through-holes, a type of wavy pattern known as a weld line is displayed on the surface of the display part. Such weld line tends to become significant at a merging point that occurs when the resin flows through a hole and then is divided into two directions followed by merging, such as when the letter "O" or another ring-shaped pattern is formed. Also, for the English letters "N" and "M", which can be written in a single stroke, a single through-hole can be used for injecting the resin. However, for said letters "M" and "N", the flow distance of the resin is lengthened, so the temperature of the melt resin at the tip of the flow falls, and thus the flowing characteristics of the resin at the tip

become different from those at the tail. Consequently, the portion of the display part near the through-hole and that near the end point of the flowing resin have a different appearance, especially different hues and gloss, so the viewer has a feeling of discomfort. This is undesired. Of course, said feeling of discomfort is an intrinsic feature so it cannot be avoided in consideration of the purpose of the display part for use as a design display surface.

The objective of the present invention is to solve the aforementioned problems of the prior art by providing a method for monolithically forming a display part on a surface of a molding characterized by the fact that the display part can be formed reliably on the surface of the molding, and, at the same time, it has an excellent appearance as a design display surface.

Here, the following two inventions are proposed in the present patent application.

The first invention provides a method for monolithically forming a display part of letters, patterns, etc. on a surface of a molding characterized by the following facts: when a display part of letters, patterns, etc. is to be formed on the surface of a molding, a recess is formed on the inner surface of the molding; from the bottom surface of the recess, through-holes are formed through the portion where the display part is to be formed; a resin for forming the display part is pressed to the display part forming portion through said recess and said through-holes to form the display part.

The second invention provides a method for monolithically forming a display part of letters, patterns, etc. on a surface of a molding characterized by the following facts: when a display part of letters, patterns, etc. is to be formed on the surface of a molding, an injecting recess and an overflow recess are formed on the inner surface of the molding; from the bottom surface of the recesses, injection through-holes and overflow through-holes are formed through the common display part forming portions, respectively; a resin for forming the display part is pressed to the display part forming portion through said injecting recess and injection through-holes, and, at the same time, the resin flows from

said display part forming portion via the overflow through-holes to said overflow recess to form the display part. In the following, an explanation will be given in more detail regarding said inventions with reference to annexed figures.

Figures 1-3 pertain to the first invention. Figure 1 is an oblique view illustrating molding outer surface side (10A) before molding of the display part. Figure 2 is an oblique view illustrating said molding inner surface side (10B). Figure 3 is a cross-sectional view illustrating the state when the display part is molded. Figures 4-9 pertain to the second invention. Figure 4 is an oblique view of molding outer surface side (20A) before molding of the display part. Figure 5 is an oblique view illustrating molding inner surface side (20B). Figure 6 is a plan view illustrating molding outer surface side (20'A) before molding of the display part in another application example. Figure 7 is a bottom view illustrating molding inner surface side (20'B). Figure 8 is a cross-sectional view illustrating the state when the display part is molded. Figure 9 is a cross-sectional view taken across 9-9 in Figure 8. Figure 10 is a cross-sectional view illustrating another example of the molding method.

First of all, in the following, an explanation will be given regarding an application example of the first invention. As shown in Figures 1 and 2, on molding (10) inner surface side (10B), recess (11) is set, and, at the same time, through-holes (12), (12), (12) are formed from recess inner bottom surface (11a) through to display part forming portions (15), (15), (15) on molding outer surface side (10A). When plural display part forming portions (15) are present, common groove shaped continuous recess (11) can be formed for through-holes (12), (12), ... corresponding to said display part forming portions (15), (15),... Of course, there is no need to form a continuous portion for all of the through-holes. In order to facilitate molding, a continuous portion may be formed only for through-holes with relatively short mutual spacing.

Figure 3 is a cross-sectional view illustrating the main portion of the dies in the state when the display part is injection molded for said molding. Here, (30) represents a lower die, (31) represents an upper die, (32) represents a runner plate, (33) represents a runner groove, (34) represents a gate hole, and (35) represents a spool hole. As shown in the figure, the resin injected from said spool hole (35) goes through runner groove (33) and gate hole (34) to fill up recess (11) formed on molding inner surface side (10B), and it then goes through various through-holes (12), (12), ... and is pressed to display part forming portions (15), (15)... to form the display part.

As shown in the figure, the advantage of the first invention is as follows. By setting a recess on the inner surface side of the molding and setting through-holes for injecting the resin from the inner bottom surface of said recess, it is possible to set the relative position of gate hole (34) corresponding to each through-hole (12). Especially, when recess (11) is formed as a continuous portion for sharing by plural through-holes as shown in the application example, it is only necessary to set the gate hole at the central portion. In addition, by curing the resin in the recess and the through-holes after molding of the display part, legs in a wedge-like cross-sectional shape are formed integrated to the display part, so it is possible to attach the display part reliably on the molding.

In the following, an explanation will be given regarding the second invention. While having the advantage of said first invention, it also achieves the following objective: it is possible to prevent generation of a weld line caused by a difference in temperature in the melt resin flowing in the display part forming portion and it is possible to eliminate a feeling of discomfort regarding the hue and gloss. In order to realize this objective, the second invention is characterized by the fact that an overflow through-hole and an overflow recess are formed, and the resin injected via the injecting recess and the injection through-hole flows into the overflow recess via the overflow through-hole. That is, in the application example shown in Figures 4, 5, 6 and 7, the symbols are used throughout them as follows:

(21) represents an injecting recess, (22) represents an injection through-hole, (23) represents an overflow recess, (24) represents an overflow through-hole, and (25) represents a display part forming portion. Said injecting recess (21) and overflow recess (23) are preferably formed as continuous portions shared by plural injection through-holes (22), (22),... and overflow through-holes (24), (24),... Also, as shown in Figure 6, when the resin flow distance is relatively lengthy and the shape is nearly symmetric for the display part, as shown in Figure 7, in the central portion, injecting recess (21) and injection through-holes (22), (22),... are set at the central portion, and, on the two ends (upper/lower sides as shown in the figure in the application example), individual overflow recesses (23), (23) and overflow through-holes (24), (24), (24),... may be set. The configuration of said injecting recess (21), injection through-holes (22), (22),... as well as overflow recess (23) and overflow through-holes (24), (24),... should be selected appropriately corresponding to the shape and configuration of the individual display part. Here, the main feature is that the configuration should be appropriate to ensure that the melt resin injected from injection through-hole (22) flows out from overflow through-hole (24), or, more preferably, the resin quickly overflows from overflow through-hole (24) so that the resin, for which the temperature at the tip of the portion injected into the display part via injection through-hole (22) falls, is not left in the display part forming portion.

Figure 8 is a cross-sectional view illustrating the state of injection molding according to the second invention. Here, the symbols pertaining to the dies are the same as those adopted in the first invention. Figure 9 illustrates the characteristic feature of the present invention. As shown in the figure, the left side pertains to the example shown in Figures 6 and 7. Here, overflow through-holes (24), (24) are formed on the two sides of injection through-hole (22) at the central portion. The right side shows the example shown in Figures 4 and 5. In both cases, the resin, which is injected into display part forming portion (25) via injection through-hole (22) and experiences a temperature decrease, is guided to

overflow through-hole (24) so that it flows into overflow recess (23) on the molding inner surface side. As a result, resin at a homogeneous temperature fills up display part forming portion (25), and it is thus possible to prevent a weld line and unevenness in the color and gloss. At the same time, just as in the case of the first invention, by curing the resin inside through-holes (22), (24) and recesses (21), (23) on the back surface side of the display part, it is possible to realize a strong attachment of the display part on the main body of the molding.

Figure 10 is a diagram illustrating an application example of molding of the display part by means of transfer molding, a feature adopted in both the first and second inventions. As shown in the figure, transfer molding die (40) is used to mold using un-cured rubber as the resin for molding the display part. It comprises upper die (41) having gate hole (43) formed from pot mold (42), plunger (45) and lower die (46). In this example, in lower die (46), display part cavity (47) is set.

As explained above, according to this invention, the resin for forming the display part monolithically fills up as it flows from the back surface side through-holes to the recess, so it is possible to form a strong display part without leaving any trace of resin injection on the surface of the display part. For example, it is possible to form a display part on an automobile side protection molding or a mudguard that is highly effective even if exposed to continuous vibration and impact. Especially, according to the second invention, it is possible to eliminate a disturbance in the molding surface caused by a difference in the resin temperature that has inevitably occurred in the past when resin was injected to form the display part, and this contributes significantly to improvement in the appearance of the display part.

Brief description of the figures

Figures 1-3 pertain to the first invention. Figure 1 is an oblique view illustrating molding outer surface side (10A) before molding of the display part. Figure 2 is an oblique view illustrating said

molding inner surface side (10B). Figure 3 is a cross-sectional view illustrating the state when the display part is molded. Figures 4-9 pertain to the second invention. Figure 4 is an oblique view of molding outer surface side (20A) before molding of the display part. Figure 5 is an oblique view illustrating molding inner surface side (20B). Figure 6 is a plan view illustrating molding outer surface side (20'A) before molding of the display part in another application example. Figure 7 is a bottom view illustrating molding inner surface side (20'B). Figure 8 is a cross-sectional view illustrating the state when the display part is molded. Figure 9 is a cross-sectional view taken across 9-9 in Figure 8. Figure 10 is a cross-sectional view illustrating another example of the molding method.

Explanation of symbols

11 Recess

12 Through-hole

15 Display part forming portion

21 Injecting recess

22 Injection through-hole

23 Overflow recess

24 Overflow through-hole

25 Display part forming portion

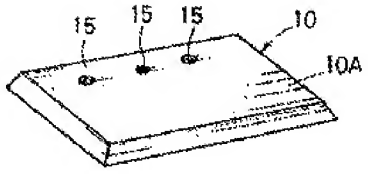

Figure 1

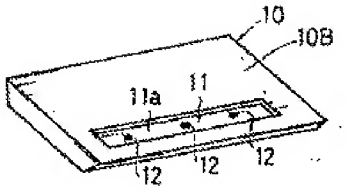

Figure 2

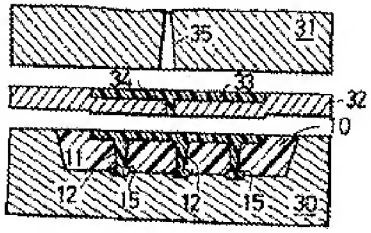

Figure 3

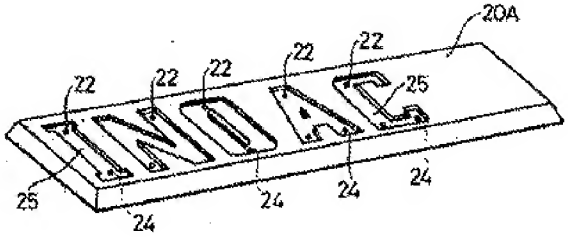

Figure 4

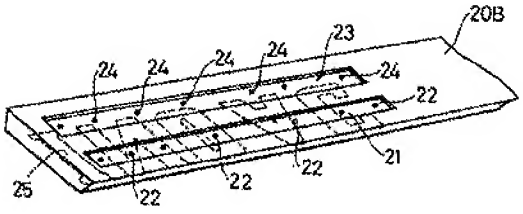

Figure 5

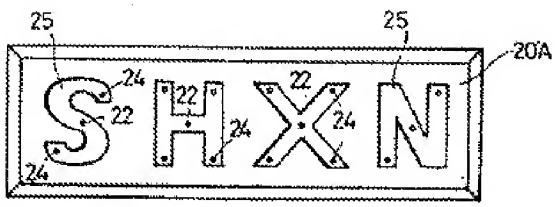

Figure 6

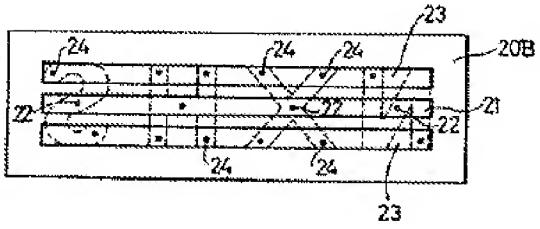

Figure 7

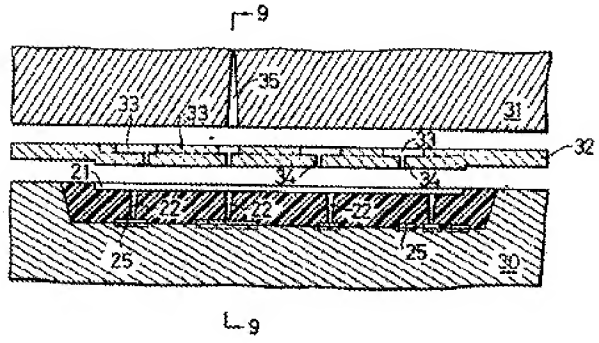

Figure 8

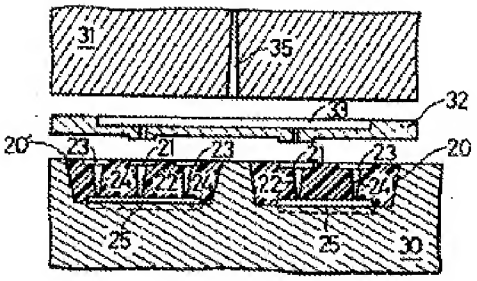

Figure 9

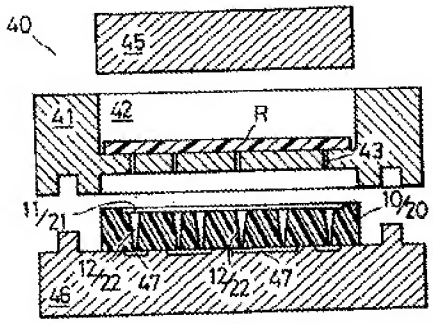

Figure 10